DOCUMENT RESUME

ED 368 327 IR 016 562

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TITLE The Electronic Classroom.
PUB DATE [94]
NOTE 11p.
PUB TYPE Viewpoints (Opinion/Position Papers, Essays, etc.) (120) -- Reports - Evaluative/Feasibility (142)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Access to Information; *Computer Assisted Instruction; Educational Environment; Educational Media; *Educational Technology; *Electronic Classrooms; Elementary Secondary Education; *Individualized Instruction; Information Dissemination; Innovation; Programmed Instruction; Teaching Methods; *Technological Advancement; *Visual Literacy
IDENTIFIERS *Intelligent Tutoring Systems

ABSTRACT

Current computerized electronic technology is making possible, not only the broad and rapid distribution of information, but also its manipulation, analysis, synthesis, and recombination. The shift from print to a combination of visual and oral expression is being propelled by the mass media, and visual literacy is both a concept and an educational movement. Computer-based intelligent tutoring systems hold the promise of individualizing instruction on a scale not seen since the emergence of the printed book. The advent of intelligent tutoring systems could turn the educational environment into a learner's market, and conventional instruction faces a formidable competitor in computer-based individualized instructional technology. Although electronic media will not supplant print technology, electronic information communication has the potential to make the ordinary person capable of superior performance as it becomes the means of knowledge dissemination in the global classroom. (Contains 24 references.) (SLD)

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The Electronic Classroom

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The Human Quest for Empowerment

Since the beginning of society, humans have almost always turned to teachers for instruction and guidance. As the knowledge base expanded, so also did educational institutions and the profession of teaching, both of which were essential in passing on the new knowledge to succeeding generations. Yet, the "self-made man" was a revered ideal, the individual who acquired knowledge and wisdom by himself or herself. He, or she, was a "Renaissance" person, an intrinsically curious and searching individual with a desire to learn and understand. Today, we might describe the Renaissance person as one who is truly empowered—he or she has "learned how to learn." In broader, perhaps more mystical terms, it is one who is intellectually free and self-actualized. Our best example is Abraham Lincoln, who managed to get only about two years of formal education—by "littles," as he put it—but he was a self-directed learner all of his life.

However, the quest for knowledge was not always happily condoned by society:

> **Forasmuch now as thou partly seest the falsehood of our prelates, how all their study is to deceive us and to keep us in darkness, to sit as gods in our consciences, and handle us at their pleasure, and to lead us whither they lust; therefore I read thee, get thee to God's word, and thereby try all doctrine, and against this receive nothing.** (William Tyndale, *The Obedience of a Christian Man)*

These words were uttered by William Tyndale, who in the 16th century translated the Bible into English (and was burned at the stake for it). In his day few people could read the Latin Vulgate Bible, so most people had to depend on trained priests to interpret the Scriptures for them. The authorities considered Tyndale's work subversive (which it was), and they put him to death eleven years after he published his translation of the Bible. His life ended only eleven months before Henry VIII, newly proclaimed head of the English Church, authorized the English Bible. Now, the common people no longer had to depend on religious authorities for enlightenment. The reverence for authority traditionally reserved for the Church was now directed toward scholars of all intellectual callings. This was a step toward emancipation from Church dogma, since scholars disagreed with each other and individual reason was required to choose

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among them. With the proliferation of books printed in the vernacular on Gutenberg's printing press (which was the information technology of that day), all who could read now had the power to acquire knowledge and to think for themselves (Crane, 1990). What is more, the proliferation of books encouraged private reading as opposed to public reading or the oral tradition. Communication could occur without the social interaction of members of society. Such communication in seclusion encouraged a new sort of individualism that is probably one of the most important differences between traditional and modern societies (Clabaugh & Rozycki, 1990, p. 326).

From Writing to Speaking and Viewing

The written word is one of the recent achievements of human beings. For 10,000 years, humans learned from gestures, images, and speech, but for the last 500 years, humans have learned primarily from print. The first form of writing was executed by means of gestures, and this "drawing in the air" came immediately prior to the development of *pictographs*, or graphic language. Pictographs bore considerable likeness to the object portrayed, such as a circle with lines emanating outward to depict the sun. Over time, conventional signs evolved to the symbolic and away from the strictly pictorial. Our Western Heritage of thought and culture evolved from the legacy of early pictographs to a highly complex, written language system. Until the invention of writing there was no effective way of preserving and passing on achievements to succeeding generations. Certainly, early communication was quite rudimentary when compared with the language that we know today—the legacy of Milton, Shakespeare, and the Bible.

Stroud (1956) cites Coulton on the level of thought of medieval times:

> **Think what the mind of the villager in medieval England must have been like. His average vocabulary was not more than a few hundred words. Perhaps all except the priests were illiterate. The villages were separated by vast forests, sources of both fear and danger. Few roads connected village with village; many persons never traveled beyond their own in their whole lives. They knew but few people. A peddler, a wandering friar, or a mason if a church needed repair, brought in such news of the outside world as the village received. The mental horizons of the people must have been limited to an appalling degree** (p. 205).

By the 20th century, the grammar and syntax of the written language had become the cultural standard not only for writing but for speaking. If one reads the speeches of Abraham Lincoln, we are struck by the formality of his prose, the carefully crafted sentence structure and syntax. In Lincoln's day, in order to achieve status and power in human affairs one had to discard vernacular speech habits and master formal, oral discourse based on the standards of the written language.

Today, the trend is to the opposite. The spoken language is becoming the standard; increasingly, we write the way we talk, and it started with America's favorite writer—Mark Twain. Novels of the 19th century and prior contained narration, but not *vernacular*. Mark Twain's decision to adopt Huck Finn as the narrator of the tale of *Huckleberry Finn* in the vernacular had important implications for literature (Emerson, 1984). This permitted Twain to not only present a story in the exact words of its chief character, it provided a vehicle for the writer to express attitudes of irreverence, skepticism, and outspokenness (with the consequence that the book when published offended many genteel readers). This was a significant step in the evolution of literature: it made the written word sound like the spoken word. Mark Twain was quite conscious of what he was doing. In a previous essay, he had railed against the literary conventions of the time, the artificial dialogue of esteemed writers. In a diatribe against James Fenimore Cooper, Twain wrote:

> **When a person has a poor ear for words, the result is a literary flatting and sharping; you perceive what he intended to say, but you also perceive that he doesn't *say* it. This is Cooper. He was not a word-musician. His ear was satisfied with the *approximate* word** (1906, p. 95).

In Huckleberry Finn, Mark Twain makes extensive use of a technique that is common in fiction writing today: telling not so much what happens as what was experienced, by the ear, the eye, all the senses. It popularized oral communication.

The teaching of English has moved away from a formal prose structure to a looser, vernacular-based standard for both writing and speaking. In the 19th Century, there was a bias against the use of the vernacular in speaking (including the use of profanity), as there still is in England today. Formal, Latin grammar was associated with middle- and upper-social classes. Today, the teaching of both writing and speaking writing is no longer based heavily on classical prose forms, but focuses instead on communicating in "plain English." In teaching writing, English teachers try to activate the writing process by having students talk about the experiences of their own lives. But in so doing, students tend to avoid the more complex—and interesting—forms of grammar and syntax, thereby getting around usage errors such as *lie* for *lay*, or *that*, for *who* or *whom* (Christensen, 1990; Mazer, 1990). One authority in English education predicts that "a new kind of hybrid, written and graphic and perhaps even spoken, may come to replace, in part, the kind of expository essay we now require of writing subjects" (Gallagher, 1988).

Government agencies, businesses, and the legal profession have begun to revise their publications and to write in "plain English," going from formal, prose forms to communication that sounds the way we would say it (Dorney, 1988). Many writers use dictation as a way of inducing written text.

The Emergence of the Visual-oral Environment

The Information Age was already here when the Apple II+ first made its appearance in schoolrooms all over the nation in the early 1980's. The instantaneous transmission of television sound and images by means of satellite relay had already shrunk the world community. Today, computerized electronic technology is making possible not only the broad and rapid distribution of information, but its manipulation, analysis, synthesis, and recombinations as well. Much of this new knowledge is, and will continue to be, expressed in printed language, but an increasing proportion of information is being produced in other forms: images—still and moving, graphic and photographics; sounds—natural and synthesized; and symbolic representations of all kinds including icons, graphs, and concept maps. Behind the technology, a pervasive, world-wide change in the nature of communication itself is underway.

The shift from *print* as the major medium of communication to a combination of *visual-oral* expression is being propelled by the mass media. Whether we welcome it or not, the amount of time that Americans spend looking at talking images on television is increasing. Furthermore, the informational value of the electronic media seems to be as important and may become even more important than its entertainment value. As a cognitive process, this phenomenon can be described as a movement from linear (print) to non-linear (oral-visual) forms of communication.

The trend from formal rhetoric to communication conveyed largely to eye and ear is reflected in the history of moving pictures. Early black-and-white films (influenced by the legitimate theatre), frequently contained long speeches, a characteristic of most of the stage plays of that era. In today's movies, however, the characters usually speak no more than three or four complete sentences at a time. Most movies, in fact, are "scripted" for action and visual impact, rather than rhetoric. The legitimate theatre, too, is evolving toward short, snappier productions. Most plays produced today have two acts that run no longer than two hours of playing time, and some run for an hour-and-a-half without an intermission. Audiences won't sit through long, dramatic orations. (The 3-hour plays of George Bernard Shaw would never get beyond a studio production.)

Youth of today are reading somewhat, but not as much as the generation before them, because reading and TV compete with each other. This fact is already evident in the comparisons of the number of hours that children spend watching television and the amount of time reading. Young people today are "two-channel learners"—one channel is what they learn at school, and the other channel is what they learn from the entertainment industry. The educational establishment is fond of blaming the distractions of audio-visual media, mostly television, for the supposed decline or lack of progress in literacy. Neil Postman, for example, argues that the habit of watching television quite literally scrambles our capacity for rational discourse, and with it our capacity to read co-

gently. He objects to the ascendancy of *visual* discourse over *literary* discourse (1983; 1992). But the evolution from print to visual has been underway for over a hundred years, and it is accelerating. It would, of course, be sad to think that future generations will be less inclined to avail themselves of our rich cultural history in print—old history and old literature. But if we look at the way most people get their information about the world now—from television, movies, radio, and telephone—it may be unrealistic to believe that they will always retrieve past glories by reading

A significant effect of the onset of the visual-oral environment may be the building up of a common, cultural heritage based not on the printed word of the past, but on electronic images. If a society shares a cultural heritage that is no longer derived from the written language, but is conveyed by current electronic imagery, that image heritage will lack the history of that society, its historical and cultural traditions, its shared values based on the past. It may be a common heritage derived from movies, TV programs, TV news bytes of the world, videotapes—all those images stored in memory, bút comprising a randomly organized "database" for contemporary values and behavior. No longer can we assume that today's youth will share their parents' knowledge of the same written literature or of history. Instead, young people may store those images that they have actually experienced, largely through the senses, which means that this generation could have a sense of history that goes back barely a decade.

Not only do the media create and control the climate in which education is perceived, but also they represent, in both content and form, a *new education*. For example, it is no longer possible to consider the political process in this country without first understanding television's impact on it. Also, it is no longer possible to examine the major health issues of today without recognizing the role that the media play in creating them and the role they can play in combating them (Considine, 1990).

Visual Literacy

Visual literacy is both a concept and an educational movement. The term, visual literacy, can be defined as ". . . the ability to understand and use images, including the ability to think, learn, and express oneself in terms of images" (Braden & Hortin, 1982, p. 41). It is clear that humans are able—somehow—to store images in their memory, as well as words, and to recall them as images and as words. But is learning from images different from the way we learn from print? Quite possibly. Humans appear to be able to hold an image in short-term memory and move it around in fairly complex ways, thereby creating a visually-organized schema for long-term storage that is not verbally or procedurally encapsulated. Researchers are studying the cortical visual area of the hu-

man brain to determine how distinct visual stimulation is from verbal information process, but the research is very tentative (Farah, 1988).

Schools may have to teach this generation of young learners how to understand images, just as once we felt it essential to teach young people how to read print. Teachers, too, will need to study the impact of images, and how much and what kind of print will have a maximum effect on the viewers. Above all, we need to accept the reality of the electronic class and what it could mean to schools of the future:

> **Electronic imagery may change the way in which we define problems and create solutions. As it becomes possible to form images of problems, rather than seeing them spelled out in linear form, we may be able to hold more complex relationships in an image and to see the interactivity of one image with another . . . . It is possible that imagery thinking may be a critically important tool for looking at a world that has become too complex, too intertwined, for linear information to handle or comprehend** (White, 1987, pp. 59-60).

The visual medium and the written language are different; they serve different purposes. Film presents provocative and illustrative images, but print is considered to be necessary for thoughtful analysis. Beginning with Comenius, who advocated pictures and graphic materials to enhance textbooks, visual content has become a major feature of most textbooks—especially those for children. The technology exists today that takes the next step: knowledge presented visually with print included for details and elaboration (White, 1991; Bracey, 1992).

The Electronic Classroom

Sesame Street

The first electronic classroom was *Sesame Street*, the creation of the Children's Television Workshop (CTW) in 1968. After 25 years, *Sesame Street* continues to be an electronic experiment designed to prepare preschool children—especially poor, inner-city children—for school. It is the result of cooperative expertise in media production, educational curriculum, children, and behavioral and cognitive psychology. The intent of *Sesame Street* is to be seriously educational and entertaining at the same time. It has had worldwide success, with licensed versions, adaptations, and coproductions of Sesame *Street* seen in approximately 115 countries (Gettas, 1990).

What accounts for *Sesame Street's* unprecedented popularity, both in the U.S. and abroad? The key factor is its broad appeal to children. Children like *Sesame Street's* humor, tempo, characters, stories, and songs. They like its muppets and its fast-paced format. It is an educational medium that speaks to them in their own language, on their level, and with respect for their intelligence.

But *Sesame Street* is not truly an *interactive* medium. It is one-way, and it sends the same electronic signals to everyone on an unchanging schedule. It can become interactive only in the home, if

parents and others discuss the programs with the children. To a limited extent, however, the producers have created some degree of interactivity. For example, in a typical interactive *Sesame Street* segment, Big Bird might look at the camera and ask, "Which one of these shapes is a square? Point to the one that's a square." With an encouraging word or a "prompt" from a parent, the child viewing the segment is likely to point at the square. The next major step—pressing a computer key, or exerting finger pressure against the monitor screen at the right place—will make the medium truly interactive. At the Children's Television Workshop research laboratory, interactive computer software is being developed that will complement the programming on *Sesame Street*. For example, *Sesame Street First Writer* is a word processor for preschoolers. It is a simplified text editor that can be used by an adult along with a small child just learning about letters, words, and writing. The child can type in words, edit the words and sentences, and scroll through the pages for review and revision. Throughout the program, icons of *Sesame Street* characters provide friendly guidance and feedback to the user, depending on his or her responses (Strommen, 1990).

Sesame Street was the first large-scale experiment in electronic education. It happened because the medium of television existed and was becoming a fixture in almost every home—whether rich or poor. From a one-way medium, the evolution of interactive video and computer technology leads to highly intelligent tutoring systems—the ultimate empowerment for learners. Like Tyndale's translation of the Bible, which common people could now own and carry with them, electronic technologies will eventually be accessible to everyone—within or outside of formal education. As they become cheaper, electronic technologies have the potential to become the private tutors of a new Renaissance, transcending the constraints imposed by socioeconomic and ethnic factors which, as research indicates, seem to play such an important and often detrimental part in the education of our young people. It could have another benefit as well: a union of work and play. If students of all ages *enjoy* learning mathematics or performing scientific experiments on a computerized tutor, they are likely to continue without the necessity for close supervision and become life-long learners.

The Individualization of Instruction

Computer-based, intelligent tutoring systems hold the promise of individualizing instruction on a scale not seen since the emergence of the printed book itself. Eventually, schools will be designed around new, computer-based technologies. They will be equipped with an individual, personal computer for each student, and possibly an interactive videodisk for every two to four students. Most students will have a computer at home and be able to access the school's system and other

data-bases at any time. Eventually, because of these new technologies, the design of instruction and even the physical layout of schools may be unrecognizable to us, may be changed in ways we can hardly imagine today.

Individualized instruction is associated with the tailoring of instruction to such characteristics of the student as entering behavior, learning style, and most often, learning rate, in recognition of the fact that different learners need different instruction. These design characteristics are usually difficult to implement in group instruction, and one-on-one, teacher-student instruction is not economically feasible. Computer-based, intelligent tutoring systems have the capability to adapt to the student *dynamically*, during on-going instruction, at each moment providing the kind of instruction most beneficial to the student at that time. In addition, the computer can be programmed to adapt both the *content* of the instruction and the *format* for delivering it. The computer can be programmed to generate a specific sequence of question, explanation, example, practice problem, illustration, or demonstration which will be most helpful to the learner.

The advent of intelligent tutoring systems, in economic terms, could turn the educational environment into a *learner's market*. Schools and teachers may no longer have an exclusive franchise to teach the young. The technology of instruction will provide the power to bypass the classroom and the campus. In fact, parents today are opting to teach their children at home in ever-greater numbers. U.S. Department of Education data indicate that home schools have increased from 15,000 in 1970 to over 250,000 in 1988 (Lines, 1987; Martin, 1988). Today, every state allows home schooling in some form, with varying levels of regulation (Mueller & Brunetti, 1989). The availability of computer-based technology will create an even more compelling alternative to public education. Whether educators agree with this trend or not, conventional classroom instruction will face a formidable competitor in computer-based, individualized instructional technology.

The Impact of Instructional Technology

The electronic media will not supplant print technology. Both are vital means of learning, possessing different strengths and performing different functions. The danger lies in the devaluing of print materials. If children can choose between playing "Space Invaders" and reading a book, how many will read a book? Without question, the visual-oral environment will change the nature of communication. Some decry the loss of classical forms of written expression, and some lament the trend toward mass communication via electronic images and sound bytes (Postman, 1983; Trotta, 1991). But it is a reality for education and for the instructional designer. What will be the quality of teaching and learning in a future of communication by images? At the present, we can judge

only by comparison with the standards of the past, with people who were educated by a print medium. Perhaps knowledge acquired by visual-oral means will be understood neither "better" nor "worse," but *differently*. It represents the latest step in a long progression of technology in communication. The alphabet provided intellectual means of recording, preserving, and transmitting the knowledge of humanity. The invention of paper and the development of writing instruments accelerated the process of recording knowledge with alphabetic symbols. Movable type made it possible to place the written word within reach of the common people. The blackboard was one of the first joint communication devices that permitted teacher and student to view the same flexible referent at the same time. The school bus influenced the way pupils were organized for learning even in the most isolated areas. Technology could make an ordinary person capable of superior performance and become the means, whether printed or electronic, to disseminate knowledge in a global classroom.

References

Bracey, G. W. (1992). Technology, falling SAT scores, and transformation of consciousness. *Technos, 1*(33), 8-11.

Braden, R. A., & Hortin, J. A. (1982). Identifying the theoretical foundations of visual literary. *Journal ofVisual Verbal Learning, 2*, 37-42.

Christensen, L. M. (1990). Teaching standard English: Whose standard? *English Journal, 79*(2), 36-40.

Clabaugh, G. K., & Rozycki, E. G. (1990). *Understanding schools: The foundations of education.* New York: Harper & Row.

Considine, D. M. (1990). Media literacy: Can we get there from here? *Educational Technology, 30*(12), 27-32.

Crane, G. (1990). Challenging the individual: The tradition of hypermedia databases. *Academic Computing, 4*(4), 22-23, 31-32, 34-38.

Dorney, J. M. (1988). The plain English movement. *English Journal, 77*(3), 49-51.

Emerson, E. (1984). *The authenic Mark Twain: A literary biography of Samuel L. Clemens.* Philadelphia: University of Pennsylvania Press.

Farah, M. J. (1988). Is visual imagery really visual? Overlooked evidence for neuropsychology. *Psychological Review, 95*(3), 307-317.

Gallagher, B. (1988). Film study and the teaching of English: Technology and the future of pedagogy. *English Journal, 77*(7), 58-61.

Gettas, G. J. (1990). The globalization of *Sesame Street:* A producer's perspective. *Educational Technology Research and Development, 38*(4), 55-63.

Lines, P. M. (1987). An overview of home instruction. *Phi Delta Kappan, 68*(7), 510-517.

Martin, C. (1988). Home school. *Sunday Denver Post/Contemporary,* May 22, 9-13.

Mazur, N. F. (1990). 'Write as thought you were talking to me': Kids, letters, and writers. *English Journal, 79*(3), 63-64.

Mueller, R. J., & Brunetti, D. (1989). Testing problems of home-schooled children. *Clearing House, 62*(7), 325-326.

Postman, N. (1983). Engaging students in the Great Conversation. *Phi Delta Kappan, 64*(5), 310-316.

Postman, N. (1992). *Technology: The surrender of culture to technology.* New York: Knopf.

Postman, L., & Sassenrath, J. (1961). The automatic action of verbal rewards and punishments. *Journal of General Psychology, 65,* 109-136.

Strommen, G. L. (1990). Research in interactive technologies at the Children's Television Workshop. *Educational Technology Research and Development, 38*(4), 65-80.

Stroud, J. B. (1956). *Psychology in education.* New York: Longmans, Green.

Trotta, L. (1991). *Fighting for air: In the trenches with television news.* New York: Simon & Schuster.

Twain, M. (1906). *How to tell a story and other essays.* New York: Harper & Brothers.

White, M. A. (1987). Information and imagery education. In M. A. White (Ed.), *What curriculum for the information age?* Hillsdale, NJ: Erlbaum.

White, M. A. (1991). Images foster greater learning. *Electronic Learning, 11*(1), 6.